



# UNITED STATES PATENT AND TRADEMARK OFFICE

HA

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/721,220

11/26/2003

Roger G. Markham

116595

5744

25944

7590

07/12/2006

OLIFF & BERRIDGE, PLC  
P.O. BOX 19928  
ALEXANDRIA, VA 22320

EXAMINER

GARCIA JR, RENE

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 07/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/721,220		MARKHAM ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Rene Garcia, Jr.		2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 April 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5,6,8-36 and 43-51 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,6,8-36,43-48,50 and 51 is/are rejected.
- 7) ☒ Claim(s) 49 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Objections*

1. Claim 8 recites the limitation "thermally-conductive filler material" in line 2. There is insufficient antecedent basis for this limitation in the claim.
2. Claim 9 recites the limitation "thermally-conductive filler material" in line 2. There is insufficient antecedent basis for this limitation in the claim.
3. Claim 11 recites the limitation "thermally-conductive filler material" in line 2. There is insufficient antecedent basis for this limitation in the claim.
4. Claim 13 recites the limitation "thermally-conductive filler material" in line 2. There is insufficient antecedent basis for this limitation in the claim.

### *Claim Rejections - 35 USC § 102*

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 6, 43, 44, 45 and 51 are rejected under 35 U.S.C. 102(b) as being anticipated by Beauchamp et al. (US 5,332,321).

#### **Beauchamp et al. discloses the following claimed limitations:**

\*regarding claims 1, 43, 44, 45 and 51, fluid ejector, comprising: (col. 2, lines 23-40)

\*thermally-conductive fluid ejector carriage/10/ (fig. 1; col. 2, lines 29-30)

\*structure/**front and rear slider rods, SF & SR**/ (fig. 1 & 2; col. 2, lines 50-56) upon

which the thermally-conductive carriage/10/ translates

Art Unit: 2853

\*at least one thermally-conductive interface structure/**front bushings & rear bushing, 80,82,70/** (fig. 2, 3B, 7; col. 2, lines 56-62; col. 3, lines 42-44) between the thermally-conductive fluid ejector carriage/**10/** and the structure/**SF & SR/** upon which the thermally-conductive carriage/**10/** translates that provides a heat flow path from the thermally-conductive fluid ejector carriage/**10/** into the at least one thermally-conductive interface structure/**80, 82, 70/** (col. 4, lines 54-58; bushings material is inherently thermally conductive)

\*wherein the at least one thermally-conductive interface structure/**80, 82, 70/** comprises at least one thermally-conductive material including at least one polymer material and at least one thermally-conductive material (col. 4, lines 54-58; Teflon is a polymer)

\*regarding claim 2, thermally-conductive interface structure is a carriage rod guide/**front and rear bushings, 80, 82, 70/** with substantially a hollow tube-like structure (fig. 2, 3B, 7; col. 3, lines 19-22, lines 42-44)

\*regarding claim 6, polymer is chemically resistant to ink (inherent feature of Teflon)

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2853

8. Claims 15, 16, 17, 19, 20, 28-33, 36, 48 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321) in view of Erickson et al. (US 4,566,345).

**Beauchamp et al. discloses the following claimed limitations:**

\*regarding claim 15, structure upon which the thermally-conductive carriage/**10**/ translates is a carriage guide rod/**front and rear slider rods, SF & SR**/ (fig. 1 & 2; col. 2, lines 50-56), where the at least one thermally-conductive interface structure/**front and rear bushings, 80, 82, 70**/ translates along the carriage guide rod/**SF & SR**/

\*regarding claims 28-33, 48 and 50, thermally-conductive interface structure/**front and rear bushings, 80, 82, 70**/ that translates along the carriage guide rod/**SF & SR**/ is a hollow tube-like rod guide structure that has a generally corresponding cross-sectional shape and a slightly larger cross-sectional area than that of the carriage guide rod, such that a thin film of air is present between the surface of the guide rod and an internal surface of the at least one thermally-conductive tube-like carriage rod guide (fig. 2, 3B and 7; col. 2, line 60 - col. 3, line 45 – bushing have rod passing through it and is movable with regards to each other, therefore cross-sectional area of is larger, and since they are movable there is also provided a thin film of air present between the two)

\*regarding claim 36, at least one mechanical device or structure/**internal lands, 90 & 92**/ (fig. 3B; col. 19-24) usable to conduct heat that is usable to augment contact between the at least one thermally-conductive carriage rod guide bearing and the carriage guide rod

**Beauchamp et al. does not disclose the following claimed limitations:**

- \*regarding claims 15 & 16, carriage guide rod is thermally-conductive
- \*regarding claim 17, thermally-conductive material includes at least one polymer
- \*regarding claim 19, polymer is chemically resistant to ink
- \*regarding claim 20, thermally-conductive material includes a polymer material and at least one thermally-conductive filler material

**Erickson et al. discloses the following:**

- \*regarding claims 15 & 16, carriage guide rod/**guide rail, 8/** (fig. 1 & 2; col. 3, lines 26-37, lines 46-49) is thermally-conductive is thermally-conductive (inherent feature of metal)
- \*regarding claim 17, thermally-conductive material includes at least one polymer (col. 3, lines 26-37; col. 3, line 67 – col. 4, lines 42 – sleeve of guide rail is polycarbonate) for the purpose of lower friction between guide rail and bearings.
- \*regarding claim 19, polymer is chemically resistant to ink (inherent property of polycarbonate) for the purpose of lower friction between guide rail and bearings
- \*regarding claim 20, thermally-conductive material includes a polymer material and at least one thermally-conductive filler material (col. 4, lines 6-10, lines 37-42) for the purpose of lower friction between guide rail and bearings

It would have been obvious at the time the inventions was made to a person having ordinary skill in the art to utilize a carriage guide rod which is thermally-conductive; thermally-conductive material includes at least one polymer; polymer is chemically resistant to ink; and thermally-conductive material includes a polymer material and at least one thermally-conductive filler material as taught by Erickson et al. into Beauchamp et al. for the purpose of lower friction between guide rail and bearings.

9. Claims 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321) and further in view of Plotkin et al. (US 6,305,786).

**Beauchamp et al. discloses all the claimed limitations except for the following:**

\*regarding claims 5 and 18, polymer is at least one of liquid crystal polymer, polyphenylene sulfide and polysulfone

**Plotkin et al. disclose the following:**

\*regarding claims 5 and 18, polymer is at least one of liquid crystal polymer, polyphenylene sulfide and polysulfone (col. 2, lines 13-15) for the purpose of making carriage lightweight

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize polymer is at least one of liquid crystal polymer, polyphenylene sulfide and polysulfone as taught by Plotkin et al. into Beauchamp et al. for the purpose of making carriage lightweight.

10. Claims 8, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321).

**Beauchamp et al. discloses all the claimed limitations except for the following:**

\*regarding claims 8 and 10, thermally-conductive filler material has a thermal conductivity greater than about 10 W/m°C

\*regarding claim 9, thermally-conductive filler material has a thermal conductivity less than about 100 W/m°C

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize different types of materials since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use for the purpose of achieving maximum designs. In re Leshin, 125, USPQ 416.

11. Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321) in view of Miller et al. (US 2005/0109766).

**Beauchamp et al. discloses all the claimed limitations except for the following:**

\*regarding claim 11, at least one of the at least one thermally-conductive filler material includes a graphite material

\*regarding claim 12, graphite material is formed using a petroleum pitch based material

\*regarding claim 13, at least one of the at least one thermally-conductive filler material is a ceramic material



Art Unit: 2853

\*regarding claim 14, ceramic material is at least one of boron nitride and aluminum nitride

**Miller et al. disclose the following:**

\*regarding claim 11, thermally-conductive filler material includes a graphite material (paragraph 0020 & 0017-0018) for the purpose of dissipating heat

\*regarding claim 12, graphite material is formed using a petroleum pitch based material (paragraph 0032) for the purpose of dissipating heat

\*regarding claim 13, thermally-conductive filler material is a ceramic material (paragraph 0020 & 0017-0018) for the purpose of dissipating heat

\*regarding claim 14, ceramic material is at least one of boron nitride and aluminum nitride (paragraph 0020 & 0017-0018) for the purpose of dissipating heat

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize thermally-conductive filler material includes a graphite material; graphite material is formed using a petroleum pitch based material; thermally-conductive filler material is a ceramic material; and ceramic material is at least one of boron nitride and aluminum nitride as taught by Miller et al. into Beauchamp et al. for the purpose of dissipating heat.

Art Unit: 2853

12. Claims 21, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321) as modified by Erickson et al. (US 4,566,345) as applied to claims 1, 15, 16 and 20 above.

**Beauchamp et al. as modified by Erickson et al. discloses all the claimed limitations except for the following:**

\*regarding claims 21 and 23, thermally-conductive filler material has a thermal conductivity greater than about 10 W/m°C

\*regarding claim 22, thermally-conductive filler material has a thermal conductivity less than about 100 W/m°C

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize different types of materials since it has been held to be with in the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use for the purpose of achieving maximum designs. In re Leshin, 125, USPQ 416.

13. Claims 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321) as modified by Erickson et al. (US 4,566,345) as applied to claims 1, 15, 16 and 20 above, and further in view of Miller et al. (US 2005/0109766).

**Beauchamp et al. as modified by Erickson et al. discloses all the claimed limitations except for the following:**

\*regarding claim 24, at least one of the at least one thermally-conductive filler material includes a graphite material

\*regarding claim 25, graphite material is formed using a petroleum pitch based material

\*regarding claim 26, at least one of the at least one thermally-conductive filler material is a ceramic material

\*regarding claim 27, ceramic material is at least one of boron nitride and aluminum nitride

**Miler et al. disclose the following:**

\*regarding claim 24, thermally-conductive filler material includes a graphite material (paragraph 0020 & 0017-0018) for the purpose of dissipating heat

\*regarding claim 25, graphite material is formed using a petroleum pitch based material (paragraph 0032) for the purpose of dissipating heat

\*regarding claim 26, thermally-conductive filler material is a ceramic material (paragraph 0020 & 0017-0018) for the purpose of dissipating heat

\*regarding claim 27, ceramic material is at least one of boron nitride and aluminum nitride (paragraph 0020 & 0017-0018) for the purpose of dissipating heat

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize thermally-conductive filler material includes a graphite material; graphite material is formed using a petroleum pitch based material; thermally-

Art Unit: 2853

conductive filler material is a ceramic material; and ceramic material is at least one of boron nitride and aluminum nitride as taught by Miller et al. into Beauchamp et al. as modified by Erickson et al. for the purpose of dissipating heat.

14. Claims 34 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321) as modified by Erickson et al. (US 4,566,345) as applied to claims 1, 15, 28, 29, 30, 43 and 44 above, and further in view of Kazuhiko (JP 06-024097).

**Beauchamp et al. as modified by Erickson et al. discloses all the claimed limitations except for the following:**

\*regarding claims 34 and 46, at least one compliant, thermally-conductive pad that is usable to augment contact between the at least one thermally-conductive carriage rod guide bearing and the at least one thermally-conductive carriage guide rod

**Kazuhiko disclose the following:**

\*regarding claims 34 and 46, at least one compliant, thermally-conductive pad/**metal bush, 2/** that is usable to augment contact between the at least one thermally-conductive carriage rod guide bearing and the at least one thermally-conductive carriage guide rod (paragraph 0012 & 0012; fig. 2 & 4) for the purpose of dissipating heat from the carriage

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize at least one compliant, thermally-conductive pad that is usable to augment contact between the at least one thermally-conductive carriage rod guide bearing and the at least one thermally-conductive carriage guide rod as taught by Kazuhiko into Beauchamp et al. as modified by Erickson et al. for the purpose of dissipating heat from the carriage

Art Unit: 2853

15. Claims 35 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beauchamp et al. (US 5,332,321) as modified by Erickson et al. (US 4,566,345) as applied to claims 1, 15, 28, 29, 30, 43 and 44 above, and further in view of Berg et al. (US 6,343,848) **Beauchamp et al. as modified by Erickson et al. discloses all the claimed limitations except for the following:**

\*regarding claims 35 and 47, at least one phase change or other thermally-conductive heat sink compound that is usable to augment contact between the at least one thermally-conductive carriage rod guide bearing and the at least one thermally-conductive carriage guide rod

**Berg et al. disclose the following:**

\*regarding claims 35 and 47, at least one phase change or other thermally-conductive heat sink compound that is usable to augment contact between the at least one thermally-conductive carriage rod guide bearing and the at least one thermally-conductive carriage guide rod (col. 3, lines 15-27 – carriage acts as a heat sink therefore it is obvious to use similar means to transfer heat between elements) for the purpose of improving heat transfer

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize at least one phase change or other thermally-conductive heat sink compound that is usable to augment contact between the at least one thermally-conductive carriage rod guide bearing and the at least one thermally-conductive carriage guide rod as taught by Berg et al. into Beauchamp et al. as modified by Erickson et al. and Kazuhiko for the purpose of improving heat transfer

***Allowable Subject Matter***

16. Claim 49 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The primary reason for indicating allowable claim 49 is the inclusion of the method steps of an fluid ejector module that includes inducing a complex air flow pattern in the thin volume of air trapped between at least an internal surface of the at least one thermally-conductive carriage rod guide and a surface of the at least one thermally-conductive carriage guide rod as the at least one the thermally-conductive carriage rod guide translates along the at least one thermally-conductive carriage guide rod. It is these steps found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

***Response to Arguments***

17. Applicant's arguments with respect to claims 1 and 43 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***


18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Johnson et al. (US 2002/0067941) teaches a printer carriage and bushings engaging a guide rail, wherein bushing may be made of bronze or various plastics. Guillen et al. (US 6,575,646) includes a carriage and bushing liners made up of plastic materials engaging a slider rod.


*Communications with the USPTO*

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Garcia, Jr. whose telephone number is (571) 272-5980. The examiner can normally be reached on M-F 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Rene Garcia Jr  
07/06

  
**STEPHEN MEIER**  
**SUPERVISORY PATENT EXAMINER**